Course Title: Digital Logic and System Design

Course Code: CSE 210

Credit Hour: 1.5

Experiment No. 6

Experiment Name: Design a 4-bit ALU with 4-bit parallel adder (IC# 7483).

Tasks:

ALU - Arithmetic and Logical Unit

Fall21

Xi = Ai + S2. S1'. S0'. Bi + S2 .S1. S0'. Bi'

Yi = S0. Bi + S1.Bi'

Zi = S2'.Ci

Arithmetic -

Input - A , B

S2	S1	S0	Cin	Xi	Yi	Fi = (Xi xor Yi xor cin)	
0	0	0	0	Ai	0	A + 0 = A	Transfer
			1	Ai	0	A + 0 +1 = A + 1	Increment
0	0	1	0	Ai	Bi	A+B (Add)	addition
			1	Ai	Bi	A+B+1 (Add)	Add with carry
0	1	0	0	Ai	Bi'	A+ B' =A-B -1	Add A with B`
			1	Ai	Bi'	A +B'+1 = A - B	Subtraction
0	1	1	0	Ai	1	A + 2^n -1	Decrement
			1	Ai	1	A + (2^n -1) + 1 = A + 2^n	Transfer

7

8

Fall 21

Final Project for Lab presentation:

Marks : 30

1. Presentation → 15 (Simulation using any Simulator)
2. Design → 10
3.

Presentation date:

10.04.2022 > B1, A2

12.04.2022 > B2, A1

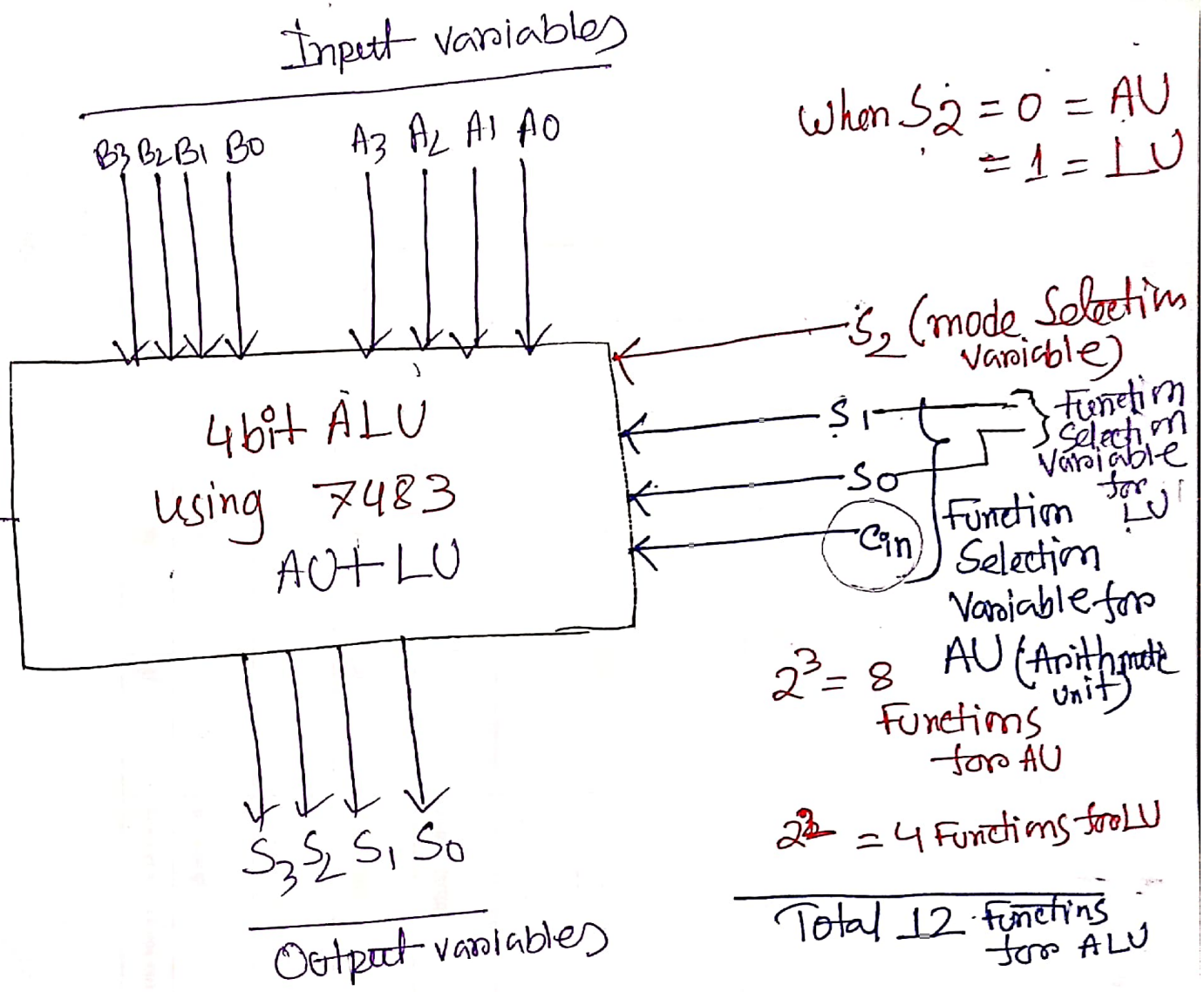

Fig: Block diagram for 4bit ALU.

Logical:

S2	S1	S0	Xi	Yi	F = (Xi xor Yi)	
1	0	0	Ai + Bi	0	A + B (or)	OR
1	0	1	Ai	Bi	A xor B	XOR
1	1	0	Ai + Bi'	Bi'	A . B	AND
1	1	1	Ai	1	A'	NOT

Xi = Ai + S2. S1'. S0'. Bi + S2 .S1. S0'. Bi'

Yi = S0. Bi + S1.Bi'

Zi = S2'.Ci

Logic Expression

Report:

1) Problem Statement

2) Instruments (used in this experiment)

3) Truth table

4) Logic expression

5) Logic Diagram

6) Discussion

Date:

03.04.22 → Registers transfers
10.04.22 → ALU Presentation
17.04.22 → Final Quiz

B1 A2

5.04.22 → Registers transfers
12.04.22 → ALU Presentation
19.04.22 → Final Quiz

B2 A1

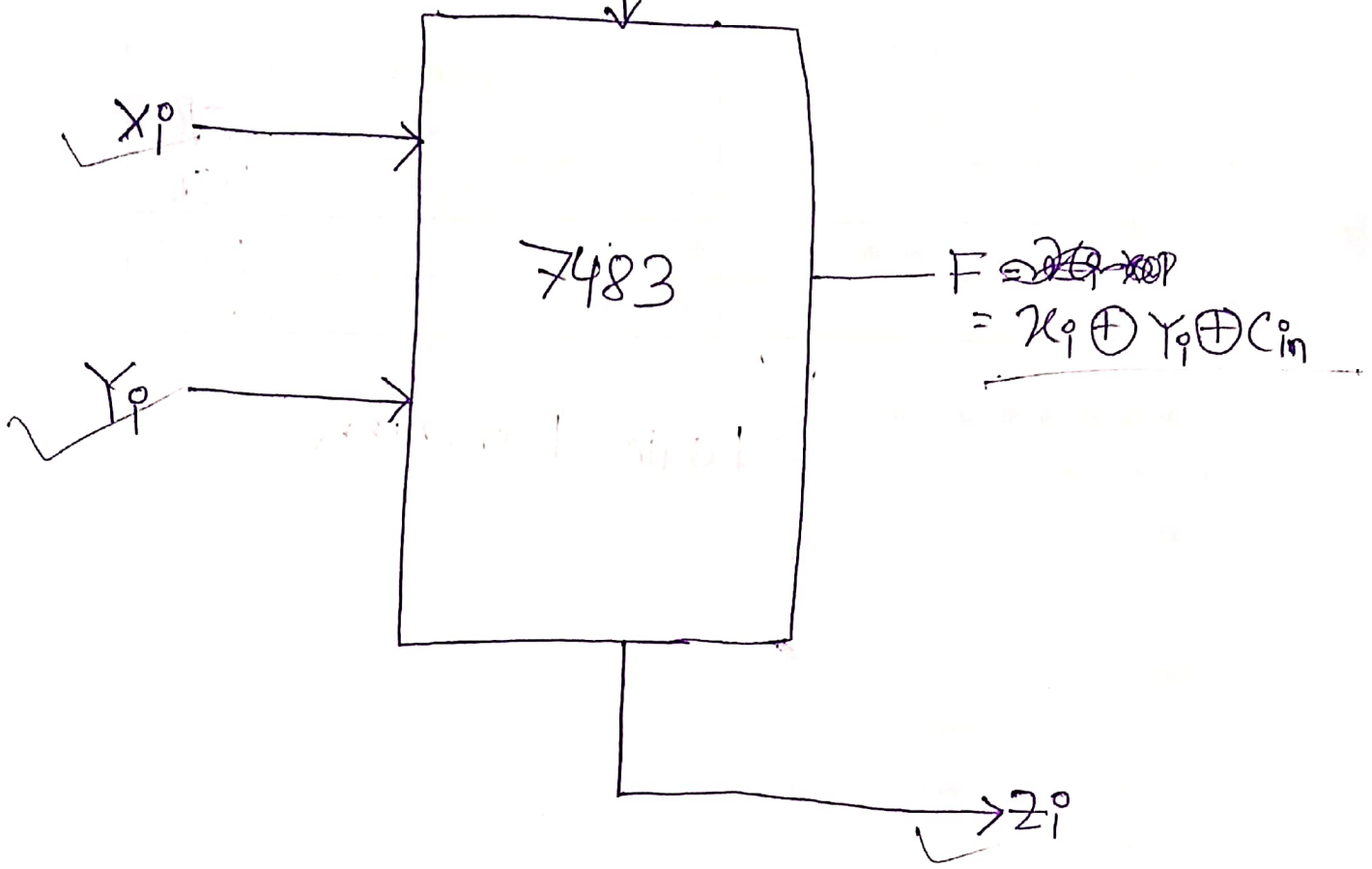

Fig: Block diagram of 7483

Example:

		A = 14 = 1110 B = 8 = 1000
9	OR	1110
10	XOR	0110
11	AND	1000
12	NOT	0001

Give Examples for 12 functions:

1. F = A = 1110
2. F = A+1 = 1111
3. F =
7. f = A-1 = 1101
8. f = A = 1110